

Importation of Immature Coconut Fruits, *Cocos nucifera* from Thailand into the United States

Qualitative, Pathway-Initiated Pest Risk Assessment

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Table of Contents

A. Introduction	1
B. Risk Assessment Methods	1
1. Initiating Event: Proposed Action	1
2. Assessment of Weediness Potential of Coconut	2
3. Previous Risk Assessments and Current Status	3
4. Pest List: Pests Associated with Coconut in Thailand	3
5. List of Quarantine Pests	11
6. Quarantine Pests Likely to Follow Pathway (Quarantine Pests Selected for Further Analysis)	12
7. Economic Importance: Consequences of Introduction	12
8. Likelihood of Introduction	13
9. Conclusion: Pest Risk Potential and Phytosanitary Measures	13
C. References	14

A. Introduction

This pest risk assessment was prepared by the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture (USDA) to examine plant pest risks associated with the importation into the United States of **immature coconut fruits (*Cocos nucifera*) grown in Thailand**. This is a qualitative pest risk assessment, that is, estimates of risk are expressed in qualitative terms such as high or low rather than numerical terms such as probabilities or frequencies. The details of methodology and rating criteria can be found in *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments, version 4.0* (USDA, 1995); available from the individual named in the proposed regulation, or on our web site at www.aphis.usda.gov/ppq/bats/bant.

International plant protection organizations, *e.g.*, North American Plant Protection Organization (NAPPO) and International Plant Protection Convention (IPPC) of the United Nations Food and Agriculture Organization (FAO), provide guidance for conducting pest risk analyses. The methods used to initiate, conduct, and report this plant pest risk assessment are consistent with guidelines provided by NAPPO, IPPC and FAO. Our use of biological and phytosanitary terms, *e.g.*, introduction, quarantine pest, conforms with the *NAPPO Compendium of Phytosanitary Terms* (Hopper, 1996) and the *Definitions and Abbreviations* (Introduction Section) in *International Standards for Phytosanitary Measures, Section 1—Import Regulations: Guidelines for Pest Risk Analysis* (FAO 1996).

The *Guidelines for Pest Risk Analysis* provided by FAO (1996) describe three stages in pest risk analysis. This document satisfies the requirements of FAO Stages 1 (initiation) and two (risk assessment).

B. Risk Assessment

1. Initiating Event: Proposed Action

This pest risk assessment is commodity-based, and therefore "pathway-initiated"; the assessment is in response to a request for USDA authorization to allow importation of a particular commodity presenting a potential plant pest risk. In this case, the importation of **immature coconut fruits (*Cocos nucifera*) grown in Thailand** is a potential pathway for introduction of plant pests. The imported coconuts (about 6 months old) are not intended for propagation; and rarely if ever sprout (Howard, 1997). The coconuts will have the exocarp and about 60% of the mesocarp (husk) removed. The peeled coconut will be tightly wrapped with clear plastic film. Regulatory authority for the importation of fruits and vegetables from foreign sources into the U.S. is found in 7 CFR §319.56 .

2. Assessment of Weediness Potential of Coconut, *Cocos nucifera*

The results of the weediness screening (Table 1) did not prompt a pest-initiated risk assessment.

Table 1: Process for Determining Weediness Potential of Commodity

Commodity: *Cocos nucifera* L. (Coconut). Arecaceae (Palmae)

Phase 1: *Cocos nucifera*, thought to be of Asian or Polynesian origin, is now widely cultivated and naturalized in the tropics of both hemispheres. Coconuts are cultivated in Florida, Hawaii, and Puerto Rico for ornament and home use.

Phase 2: Is the species listed in:

- | | |
|-----------|--|
| <u>NO</u> | <i>Geographical Atlas of World Weeds</i> (Holm <i>et al.</i> , 1979) |
| <u>NO</u> | <i>World's Worst Weeds</i> (Holm <i>et al.</i> , 1977) |
| <u>NO</u> | <i>Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act</i> (Gunn and Ritchie, 1982) |
| <u>NO</u> | <i>Economically Important Foreign Weeds</i> (Reed, 1977) |
| <u>NO</u> | Weed Science Society of America list (WSSA, 1989) |
| <u>NO</u> | Is there any literature reference indicating weediness (<i>e.g.</i> , <i>AGRICOLA</i> , <i>CAB</i> , <i>Biological Abstracts</i> , <i>AGRIS</i> ; search on "species name" combined with "weed"). |

Phase 3: Conclusion: In the absence of any reports documenting weediness potential we proceeded with the pest risk assessment.

3. Previous Risk Assessment and Current Status

Decision history for *Cocos nucifera*

1989 - Mexico: Denied entry of immature coconuts with husk and milk. No approved treatment for the red-ring nematode, *Rhadinaphelenchus cocophilus*.
This is the only record on file.

4. Pest List: Pests Associated with *Cocos*

The pest list in Table 2 was developed after a review of the information sources listed in USDA (1995). The list represents those pests that may be associated with unprocessed coconut fruit or other plant parts. The list summarizes information on the distribution of each pest, pest-commodity association, and regulatory history.

Table 2: Pest List - *Cocos nucifera*

Scientific Name, Classification	Distribution ¹	Comments ²	References
Pathogens			
<i>Bipolaris incurvata</i> (C. Bernard) Alcorn (Fungi Imperfecti: Hyphomycetes)	TH,US(FL, HI)	a	Chase and Broschat, 1991; Ellis and Holliday, 1972; Farr <i>et al.</i> , 1989
<i>Ceratocystis fimbriata</i> Ellis & Halst. (Ascomycete: Pyrenomycetes)	TH,US	a,c,o	CMI, 1983
<i>Ceratocystis paradoxa</i> (Dade) C. Moreau (Ascomycete: Pyrenomycetes) Anamorph: <i>Chalara paradoxa</i> (De Seyn.) Sacc.	TH,US(CA, FL,HI)	a,c,m,o	Holliday, 1980; Ohler, 1984; Farr <i>et al.</i> , 1989
<i>Diplodia</i> sp. (Fungi Imperfecti: Coelomycetes)	TH	a	Anon, 1981
<i>Ganoderma cingulata</i> Pat. (Basidiomycetes: Aphyllophorales)	TH	a	CPC, 1997
<i>Ganoderma zonatum</i> Murrill (Basidiomycetes, Aphyllophorales)	ASIA,US (Southern States)	o,v	Chase and Broschat, 1991; Farr <i>et al.</i> , 1989
<i>Gliocladium vermoesenii</i> (Biourge) Thom (Fungi Imperfecti: Hyphomycetes)	TH,US	a,k,o,v	Chase and Broschat, 1991; Farr <i>et al.</i> , 1989
<i>Gloeosporium coccophilum</i> (Wakef.) (Fungi Imperfecti: Coelomycetes)	TH	a	Anon, 1962
<i>Glomerella cingulata</i> (Stonem.) Spauld. & Schrenk (Pyrenomycetes: Phyllachorales)	TH,US	c,o	CPC, 1997
<i>Graphiola phoenicis</i> (Moug.) Poit. (Basidiomycetes: Ustilaginales)	TH,US	a,c,k,o	Chase and Broschat, 1991; Farr <i>et al.</i> , 1989

<i>Pestalotiopsis palmarum</i> (Cooke) Steyaert (Fungi Imperfecti: Coelomycetes)	TH,US(FL)	a,c,o	Chase and Broschat, 1991; Mordue and Holliday, 1971
<i>Pestalotiopsis</i> sp.(Fungi Imperfecti: Coelomycetes)	TH	z _e	USDA, 1997
<i>Phoma</i> sp. (Fungi Imperfecti: Coelomycetes)	TH	z _{et}	USDA, 1997
<i>Phomopsis</i> sp. (Fungi Imperfecti: Coelomycetes)	TH	a	USDA, 1997
<i>Phytophthora palmivora</i> (E.J. Butler) E.J. Butler (Oomycetes: Peronosporales)	TH,US	c,o,z _{et}	Chase and Broschat, 1991; Farr <i>et al.</i> , 1989
<i>Pseudoepicoccum cocos</i> (F.L. Stevens) M.B. Ellis (Fungi Imperfecti: Hyphomycetes)	TH	a	Hyde, 1992
<i>Pythium</i> sp. (Oomycetes: Peronosporales)	TH	a	Anon., 1981
<i>Septoria</i> sp. (Fungi Imperfecti: Coelomycetes)	TH	a	USDA, 1997
<i>Rigidoporus lignosus</i> (Klotzsch) Imazeki (Basidiomycetes: Aphyllophorales)	TH	a	CMI, 1974
Bacteria			
None in Bradbury for which <i>Cocos nucifera</i> was a natural host.			
Viruses			
No specific virus diseases reported in Thailand on coconut. Chiarappa, 1992; Brunt <i>et al.</i> , 1990; Brunt <i>et al.</i> , 1996.			
Phytoplasmas			
None known for Thailand			
Disease of Unknown Aetiology			
CCCVd Viroid-like Sequences	TH	z _i	Hanold and Randles, 1997
Arthropods			
<i>Adoretus griseasetosus</i> Nonfried (Coleoptera: Scarabaeidae)	TH	a	Anon, 1965
<i>Adoretus sinicus</i> Burm. (Coleoptera: Scarabaeidae)	TH,US	a	CIE, 1981; Lepesme, 1947; Napometh, 1978
<i>Aleurocanthus cocois</i> Corbett (Homoptera: Aleyrodidae)	TH	a	Mound and Halsey, 1978

<i>Aleurocanthus gateri</i> Corbett (Homoptera: Aleyrodidae)	TH	a	Mound and Halsey, 1978
<i>Aleurocanthus woglumi</i> Ashby (Homoptera: Aleyrodidae)	TH,US(FL,HL,T X)	a,g	IIIE, 1995; Lepesme, 1947
<i>Aleurodicus destructor</i> (Mackie) (Homoptera: Aleyrodidae)	TH	a,v	CIE, 1976; CPC, 1997; Hill, 1983
<i>Aleurodicus dispersus</i> Russell (Homoptera: Aleyrodidae)	TH,US	o	CPC, 1997
<i>Amathusia phidippus</i> L. (Lepidoptera: Nymphalidae)	TH	a	CPC, 1997
<i>Amathusia phidippus</i> var. <i>adustatus</i> Fruhst. (Lepidoptera: Nymphalidae)	TH	a	Anon., 1965
<i>Anomala pallida</i> Fabricius (Coleoptera: Scarabaeidae)	TH	a	CPC, 1997
<i>Aonidiella around</i> (Mescal) (Homoptera: Disputed)	TH,US	c,m	Lever, 1969; Nakao et al. 1977; Nakahara, 1982
<i>Aonidiella inornata</i> McKenzie (Homoptera: Disputed)	TH,US(GU,PR)	a,g	Nakahara, 1982; USDA, 1997
<i>Aphis gossypii</i> Glover (Homoptera: Aphididae)	TH,US	c,o	CPC, 1997
<i>Araecerus fasciculatus</i> (De Geer) (Coleoptera: Anthribidae)	TH,US	c,o	CPC, 1997
<i>Artona (=Brachartonia) catoxantha</i> Hampson (Lepidoptera: Zygaenidae)	TH	a	Anon., 1965; Zhang, 1994
<i>Aspidiotus destructor</i> Signore (Homoptera: Disputed)	TH,US	c,o	Kanagaratnam et al., 1987; Nakahara, 1982
<i>Aularches miliaris</i> Linnaeus (Orthoptera: Pyrgomorphidae)	TH	a	Brown, 1968; Lever, 1969
<i>Cania bandura</i> Moore (Lepidoptera: Limacodidae)	TH	a	Cock et al., 1987
<i>Cania robusta</i> Hering (Lepidoptera: Limacodidae)	TH	a	Cock et al., 1987
<i>Cania siamensis</i> Tam (Lepidoptera: Limacodidae)	TH	a	Cock et al., 1987
<i>Chalcocelis alboguttatus</i> Snellen (Lepidoptera: Limacodidae)	TH	a	Cock et al., 1987
<i>Chrysomphalus aonidum</i> (L.) (Homoptera: Diaspididae))	TH?,US	o,v,z _e	Hill, 1983; IIIE, 1988
<i>Chrysomphalus dictyospermi</i> (Morg.) (Homoptera: Diaspididae))	TH,US	o,z _e	CIE, 1969a; Hill, 1983

<i>Cnaphalocrocis medinalis</i> (Guenee) (Lepidoptera: Pyralidae)	TH	a	CPC, 1997
<i>Coccus hesperidum</i> L. (Homoptera: Coccoidea)	TH,US	o	CIE, 1972b, Lepesme, 1947
<i>Colomerus novahebridensis</i> Keifer (Acari: Eriophyidae)	TH	z _e	Ohler, 1984
<i>Coptotermes curvignatus</i> Holmgren. (Isoptera: Rhinotermitidae)	TH	a,m	Brown, 1968; Haverty <i>et al.</i> , 1991; Lever, 1969
<i>Cryptothelaea</i> sp. (Lepidoptera: Psychidae)	TH	a	Anon., 1965
<i>Darna diducta</i> Snellen (Lepidoptera: Limacodidae)	TH	a	Cock <i>et al.</i> , 1987
<i>Darna furva</i> Wileman (Lepidoptera: Limacodidae)	TH	a	Cock <i>et al.</i> , 1987
<i>Darna pallivitta</i> Moore (Lepidoptera: Limacodidae)	TH	a	Cock <i>et al.</i> , 1987
<i>Darna sordida</i> Snellen (Lepidoptera: Limacodidae)	TH	a	Cock <i>et al.</i> , 1987
<i>Darna tuaranensis</i> Holloway (Lepidoptera: Limacodidae)	TH	a	Cock <i>et al.</i> , 1987
<i>Diocalandra frumenti</i> F. (Coleoptera: Curculionidae)	TH	e	Anon., 1965
<i>Dysmicoccus brevipes</i> (Cockerell) (Homoptera: Pseudococcidae)	TH,US	o,v	CIE, 1972a
<i>Elymnias hypermnestra</i> L. (Lepidoptera: Nymphalidae)	TH	a	Anon., 1962
<i>Elymnias hypermnestra violetta</i> f. <i>epixantha</i> Fruhst. (Lepidoptera: Nymphalidae)	TH	a	Anon., 1965
<i>Erinota thrax</i> (Linnaeus) (Lepidoptera: Hesperiidae)	TH,US(GU,HI)	a	CPC, 1997
<i>Ferrisia virgata</i> (Cockerell) (Homoptera: Pseudococcidae)	TH,US	c,m,o,z _e	CIE, 1966; Williams and Willink, 1992
<i>Heliothrips haemorrhoidalis</i> Bouche (Thysanoptera: Thripidae)	TH,US	o	CPC, 1997
<i>Hemiberlesia palmae</i> (Cockerell) (Homoptera: Disputed)	TH,US	o,v	Hill, 1983
<i>Hidaei irava</i> (Moore) (Lepidoptera: Hesperiidae)	TH	a	CPC, 1997
<i>Hypomeces squamosus</i> (Fabricius) (Coleoptera: Curculionidae)	TH	e	III, 1988; Lepesme, 1947

<i>Icerya aegyptiaca</i> Douglas (Homoptera: Margarodidae)	TH,US(HI)	a	CPC, 1997
<i>Icerya seychellarum</i> (Westwood) (Homoptera: Margarodidae)	TH,US(HI)	a	CPC, 1997
<i>Idonauton apicalis</i> Walker (Lepidoptera: Limacodidae)	TH	a	Cock <i>et al.</i> , 1987
<i>Ischnaspis longirostris</i> (Signore) (Homoptera: Disputed)	TH,US	o,v	CIE, 1967a
<i>Lepidosaphes similis</i> Beardsley (Homoptera: Disputed)	TH	z _e	USDA, 1997
<i>Lotongus schaedia</i> Hew. (Lepidoptera: Hesperiidae)	TH	a	Anon., 1965
<i>Lymantria atemeles</i> Coll. (Lepidoptera: Lymantriidae)	TH	a	Anon., 1965
<i>Mahasena corbetti</i> Tams (Lepidoptera: Phycidae)	TH	a	CPC, 1997
<i>Microtermes obesi</i> Tams (Isoptera: Kalotermitidae)	TH	a	CPC, 1997
<i>Necrobia rufipes</i> (De Geer) (Coleoptera: Cleridae)	TH,US	c,o	CPC, 1997
<i>Nipaecoccus nipae</i> (Mescal) (Homoptera: Pseudococcidae)	TH,US	c,o	CPC, 1997
<i>Nipaecoccus viridis</i> (<i>vastator</i>) (Newst.) (Homoptera: Pseudococcidae)	TH	z _e	Anon., 1962
<i>Oligonychus biharensis</i> (Hirst)(Acari: Tetranychidae)	TH	a	CPC, 1997
<i>Oligonychus modestus</i> (Banks) (Acari: Tetranychidae)	TH,US	a,o	Ghai and Wadhi, 1983; Jeppson <i>et al.</i> , 1975
<i>Orgyia turbata</i> Butler (Lepidoptera: Lymantriidae)	TH	a	CPC, 1997
<i>Oryctes gnu</i> Mohner (Coleoptera: Scarabaeidae)	TH	a	O'Connor, 1969
<i>Oryctes rhinoceros</i> Linn. (Coleoptera: Scarabaeidae)	TH	a	Anon., 1965; Harries, 1977
<i>Oryzaephilus mercator</i> (Fauvel) (Coleoptera: Cucujidae)	TH,US	b,o	CPC, 1997
<i>Parasa darma</i> Moore (Lepidoptera: Limacodidae)	TH	a	Cock <i>et al.</i> , 1987
<i>Parasa lepida</i> Cramer (Lepidoptera: Limacodidae)	TH	a	Anon., 1965; Lepesme <i>et al.</i> , 1947; Zhang, 1994

<i>Parasaissetia nigra</i> (Nietner) (Homoptera: Coccidae)	TH,US	c,o	CPC, 1997
<i>Patanga succincta</i> Linne (Orthoptera: Acrididae)	TH	a,m	Lepesme <i>et al.</i> , 1947; Lever, 1969; Namruangsri, 1976; Samsinakora and Purrini, 1986
<i>Pelopidas mathias</i> (Fabricius) (Lepidoptera: Hesperiidae)	TH	a	CPC, 1997
<i>Phenice moesta</i> Westw. (Hemiptera: Fulgoridae)	TH	a	Anon., 1965
<i>Pinnaspis buxi</i> (Bouche) (Homoptera: Diaspididae)	TH,US	o,v	CIE, 1967b
<i>Planococcus citri</i> (Risso) (Homoptera: Pseudococcidae)	TH,US	m,o,z _e	CIE, 1969b; Williams and Willink, 1992
<i>Planococcus lilacinus</i> (Cockerell) (Homoptera: Pseudococcidae)	TH,US(GU)	a	CPC, 1997
<i>Plesispa reichei</i> Chapuis (Coleoptera: Chrysomelidae)	TH	a	Howard, 1997
<i>Promecotheca cumingi</i> Baly (Coleoptera: Chrysomelidae)	TH	a	CPC, 1997
Pseudococcidae, species of.	TH	z _e	USDA, 1997
<i>Pseudococcus comstocki</i> (Kuwana) (Homoptera: Pseudococcidae)	TH,US	o	Anon., 1962; IIE, 1989
<i>Pseudococcus longispinus</i> (Targioni Tozzetti) (Homoptera: Pseudococcidae)	TH?.US	o,v,z _e	CIE, 1984; Hill, 1983
<i>Rhynchophorus ferrugineus</i> Olivier (Coleoptera: Curculionidae)	TH	e	Ohler, 1984
<i>Rhynchophorus schach</i> Olivier (Coleoptera: Curculionidae)	TH	e	Ohler, 1984
<i>Rhynchophorus vulneratus</i> (Panzer) (Coleoptera: Curculionidae)	TH	e	CPC, 1997
<i>Saissetia coffeae</i> Walker (Homoptera: Coccidae)	TH,US	c,o	CPC, 1997
<i>Setroa nitens</i> Walker (Lepidoptera: Limacodidae)	TH	v	IIE, 1991
<i>Spodoptera litura</i> (Fabricius) (Lepidoptera: Noctuidae)	TH	a	IIE, 1993; Lepesme, 1947
<i>Spodoptera maurita</i> (Boisd.) (Lepidoptera: Noctuidae)	TH	a	CIE, 1973; Lepesme, 1947

<i>Stephanitis typica</i> (Dist.) (Heteroptera: Tingidae)	TH	a	Anon., 1965
<i>Tetranychus cinnabarinus</i> Boisduval (Acari: Tetranychidae)	TH,US	c,o	CPC, 1997
<i>Thosea bipartita</i> Hering (Lepidoptera: Limacodidae)	TH	a	Cock <i>et al.</i> , 1987
<i>Thosea loesa</i> Moore. (Lepidoptera: Limacodidae)	TH	a	Anon., 1965
<i>Thosea siamica</i> Holloway (Lepidoptera: Limacodidae)	TH	a	Cock <i>et al.</i> , 1987
<i>Thosea sinensis</i> Walker (Lepidoptera: Limacodidae)	TH	a	Anon., 1965
<i>Tirathaba mundella</i> Walker (Lepidoptera: Pyralidae)	TH	a	Ohler, 1984
<i>Tirathaba rufivena</i> Walker (Lepidoptera: Pyralidae)	TH	a	Anon., 1965
<i>Valanga nigricornis</i> (Burm.) (Orthoptera: Acrididae)	TH	a	CIE, 1973; Lepseme <i>et al.</i> , 1947
<i>Xyleborus perforans</i> Wollaston. (Coleoptera: Scolytidae)	TH	a	CIE, 1973b; Lever, 1969
<i>Xylotrupes gideon</i> (Linnaeus) (Coleoptera: Scarabaeidae)	TH	a	CPC, 1997

¹ Distribution legend: AS = Asia; TH = Thailand; US = United States; CA = California; FL = Florida; GU = Guam; HI = Hawaii; PR = Puerto Rico; TX = Texas

² Comments:

a	= Pest mainly associated with a plant part other than the commodity.
b	= Not likely to be a primary plant pest.
c	= Listed in USDA's non-reportable dictionary as non-actionable.
e	= Although pest attacks commodity, it would not be expected to remain with the commodity during processing.
g	= Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows: pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity.
k	= Not specifically listed for host, but reported from other hosts in same plant genus/family.
m	= The pest occurs within the country of export and has been reported to attack the specified host species in other geographic regions; but has not been reported to attack the specified host species in the country of export.
o	= Organism does not meet the geographic or regulatory definition of a quarantine pest.
v	= No specific reports of the pest from PRA area, but regional reports exist and the pest may be present in the PRA area.
z _e	= External pest: is known to attack or infest fruits and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.
z _i	= Internal pest: is known to attack or infest fruits and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.

5. List of Quarantine Pests

The list of quarantine pests for commercial shipments of unprocessed coconuts from Thailand is provided in Table 3. Should any of these pests be intercepted on commercial (or any other) shipments of *Cocos nucifera*, quarantine action may be taken.

Table 3: Quarantine Pests:

Pathogens	<i>Bipolaris incurvata</i> <i>Diplodia</i> sp. <i>Ganoderma cingulata</i> <i>Pestalotiopsis</i> sp. <i>Phomopsis</i> sp.	<i>Pseudoepicoccum cocos</i> <i>Pythium</i> sp. <i>Septoria</i> sp. <i>Rigidoporus lignosus</i>
Unknown Etiology	CCCVd Viroid-like Sequences	
Arthropods	<i>Adoretus griseasetosus</i> <i>Aleurocanthus cocois</i> <i>Aleurocanthus gateri</i> <i>Aleurocanthus woglumi</i> <i>Aleurodicus destructor</i> <i>Aleurodicus dispersus</i> <i>Amathusia phidippus</i> <i>Amathusia phidippus</i> var. <i>adustatus</i> <i>Anomala pallida</i> <i>Aonidiella inornata</i> <i>Artona catoxantha</i> <i>Aularches miliaris</i> <i>Cania bandura</i> <i>Cania robusta</i> <i>Cania siamensis</i> <i>Chalcocelis albiguttatus</i> <i>Colomerus novahebridensis</i> <i>Coptotermes curvignatus</i> <i>Cryptothlea</i> sp. <i>Darna diducta</i> <i>Darna furva</i> <i>Darna pallivitta</i> <i>Darna sordida</i> <i>Darna tuaranensis</i> <i>Diocalandra frumenti</i> <i>Elymnias hypermnestra</i> <i>Elymnias hypermnestra</i> violetta f. <i>expixantha</i> <i>Hidaei irava</i> <i>Hypomeces squamosus</i> <i>Icerya aegyptiaca</i>	<i>Icerya seychellarum</i> <i>Idonauton apicalis</i> <i>Lepidosaphes similis</i> <i>Lotongus schaedla</i> <i>Lymantria atemeles</i> <i>Mahasena corbetii</i> <i>Microtermes obesi</i> <i>Nipaecoccus viridis</i> <i>Oligonychus biharensis</i> <i>Orgya turbata</i> <i>Oryctes gnu</i> <i>Oryctes rhinoceros</i> <i>Parasa darma</i> <i>Parasa lepida</i> <i>Patanga succincta</i> <i>Pelopidas mathias</i> <i>Phenice moesta</i> <i>Planococcus lilacinus</i> <i>Plesispa reichei</i> <i>Promecotheca cumingi</i> <i>Pseudococcidae</i> , species of. <i>Rhynchophorus ferrugineus</i> <i>Rhynchophorus schach</i> <i>Rhynchophorus vulneratus</i> <i>Setroa nitens</i> <i>Spodoptera litura</i> <i>Spodoptera maurita</i> <i>Stephanitis typica</i> <i>Thosea bipartita</i> <i>Thosea loesa</i> <i>Thosea siamica</i> <i>Thosea sinensis</i> <i>Tirathaba mundella</i> <i>Tirathaba rufivena</i> <i>Valanga nigricornis</i> <i>Xyleborus perforans</i> <i>Xylotrupes gideon</i>

6. Quarantine Pests Likely to Follow Pathway (i.e., Quarantine Pests Selected for Further Analysis)

Only those quarantine pests that can reasonably be expected to follow the pathway, *i.e.*, be included in commercial shipments of *Cocos nucifera* were analyzed in detail (USDA, 1995). Only quarantine pests listed in Table 4 were selected for further analysis and subjected to steps 7-9 below.

Table 4: Quarantine Pest Selected for Further Analysis:

Unknown etiology	CCCVd Viroid-like Sequences
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The removal of most of the husk will preclude fruit pests from moving with the commodity. Other plant pests in this Assessment, not chosen for further scrutiny, may be potentially detrimental to the agricultural production systems of the United States; however, there were a variety of reasons for not subjecting them to further analysis. For example, they are associated mainly with plant parts other than the commodity; they may be associated with the commodity (however, it was not considered reasonable to expect these pests to remain with the commodity during processing); they have been intercepted as biological contaminants of these commodities during inspections by Plant Protection and Quarantine Officers; but, would not be expected to be present with every shipment. In addition, the biological hazard of organisms identified only to the generic level are not assessed due to the lack of adequate biological/taxonomic information. This lack of biological information on any given insect or pathogen should not be equated with low risk. By necessity, pest risk assessments focus on those organisms for which biological information is available. By developing detailed assessments for known pests that inhabit a variety of niches on the parent species, *i.e.* on the surface of or within the bark/wood, on the foliage, etc., effective mitigation measures can be developed to eliminate the known organism and any similar unknown ones that inhabit the same niches.

7. Economic Importance: Consequences of Introduction

The consequences of introduction were considered for each quarantine pest selected for further analysis. For qualitative, pathway-initiated pest risk assessments, these risks are estimated by rating each pest with respect to five risk elements (USDA, 1995). Table 5 shows the risk ratings for these risk elements.

Table 5: Risk Rating: Consequences of Introduction

Pest	Climate/ Host	Host Range	Dispersal	Economic	Environ- mental	Risk Rating
CCCVd Viroid-like sequences	medium	medium	low	low	low	low

8. Likelihood of Introduction

Each pest is rated with respect to introduction potential, *i.e.*, entry and establishment. Two separate components are considered. First, the amount of commodity likely to be imported is estimated. More imports lead to greater risk; therefore, the risk rating for the quantity of commodity is the same for all quarantine pests considered. Second, five biological features, *i.e.* (risk elements) concerning the pest and its interactions with the commodity are considered. The resulting risk ratings are specific to each pest. The cumulative risk rating for introduction was considered to be an indicator of the likelihood that a particular pest would be introduced (USDA, 1995). Table 6 shows our ratings for these risk elements.

Table 6: Risk Rating: Likelihood of Introduction

Pest	Quantity of commodity imported annually	Likelihood survive postharvest treatment	Likelihood survive shipment	Likelihood not detected at port of entry	Likelihood moved to suitable habitat	Likelihood find suitable host	Risk rating
CCCVd Viroid-like sequences	low	high	high	high	low	low	medium

9. Conclusion: Pest Risk Potential and Phytosanitary Measures

The measure of pest risk potential combines the risk ratings for consequences and likelihood of introduction (USDA, 1995). The estimated pest risk potential for each quarantine pest selected for further analysis is provided in Table 7.

Table 7: Pest Risk Potential, Quarantine Pests

Pest	Pest risk potential
CCCVd Viroid-like sequences	medium

Plant pests with a high Pest Risk Potential may require specific phytosanitary measures. The choice of appropriate sanitary and phytosanitary measures to mitigate risk is undertaken as part of Risk Management and is not addressed, *per se*, in this document.

PPQ has several hundred plant pest interceptions from *Cocos nucifera* fruits from other areas; however, removal of the husk would eliminate them. Some of these same pests occur in Thailand in addition to other quarantine pests and have been intercepted as hitchhikers with other commodities. Should any of these pests be intercepted with commercial (or any other) shipments of *Cocos nucifera*, quarantine action may be taken.

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